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contracting states:(71) Applicant: **MATSUSHITA ELECTRIC IND CO  
LTD**(72) Inventor: **KIM HANMIN  
SHIBUYA MUNEHIRO  
YOSHIDA TETSUHISA  
KITAGAWA MASATOSHI**

(74) Representative:

**(54) ANISOTROPICALLY  
ETCHING METHOD FOR  
SILICON SUBSTRATE AND  
MANUFACTURE OF SOLAR  
CELL**

(57) Abstract:

**PROBLEM TO BE SOLVED:** To deeply form anisotropically etched pits into an Si substrate surface by introducing an etching gas conc. at least either  $\text{ClF}_3$  or  $\text{XeF}_2$  into a reactor chamber at the atmospheric pressure, and etching the substrate surface at specified temp. with this gas to form anisotropically etched pits thereinto.

**SOLUTION:** A  $\text{ClF}_3$  gas is fed into a reaction chamber 13 at room temp. and atmospheric pressure, at a rate of 0.2 lit./min. with  $\text{N}_2$  fed at 2 lit./min. to etch Si 100 and 111 substrate for 2 min. at room temp., thereby forming rectangular and pyramid-like etched pits into the (100)- and (111)-plane substrates. The temp. rise in the structure due to the heat may change the isotropic etching, and hence substrate temp. is suppressed below  $130^\circ\text{C}$ . After cooling the substrate, the above steps are repeated to make the anisotropic etching, thus forming a deep irregularities structure. Thus, a substrate having square and pyramid etched pits is formed.

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